$$g = \int_0^x f(t)\,dt$$

$$g(-1) = \int_0^{-1} f(t)\,dt = -\int_{-1}^{0} f(t)\,dt = -\frac{3}{2}$$

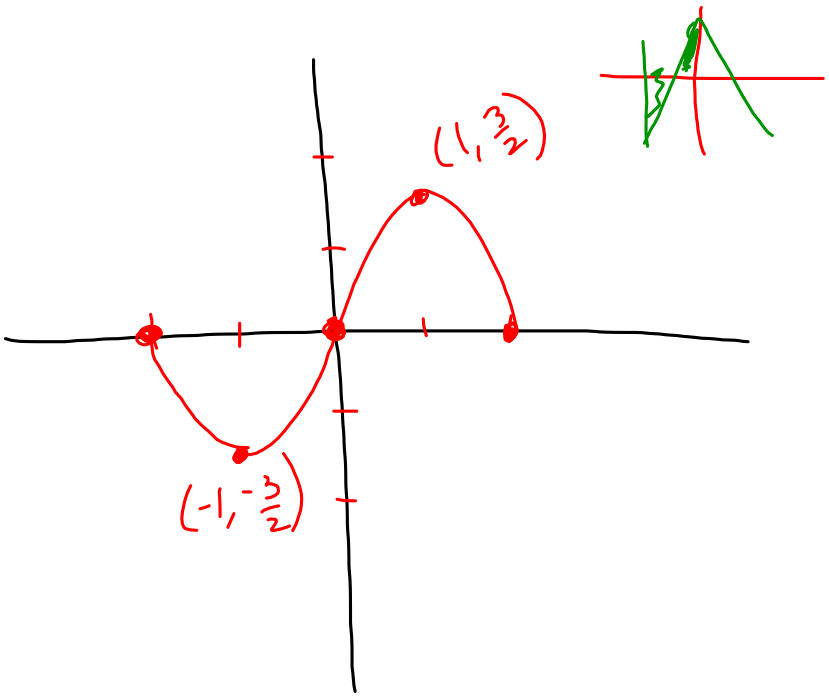
area

look @ the graph

$$g'(-1) = f(-1) = 0$$

slopes of graph (f)

$$g''(-1) = 3$$



48. $\int \sec^4 x\,dx$ $\qquad \sec^2 x = 1 + \tan^2 x$

$\int \sec^2 x \cdot \sec^2 x\,dx$

$\int \sec^2 x\,(1 + \tan^2 x)\,dx$ $\qquad u = \tan x$

$du = \sec^2 x\,dx$

$\int \cancel{\sec^2 x}\,(1 + u^2)\,\frac{du}{\cancel{\sec^2 x}}$

$\int 1 + u^2\,du$

$= u + \frac{u^3}{3} + C$

$= \tan x + \frac{\tan^3 x}{3} + C$

71.

58. $\int_{-\pi}^{\pi} \frac{\cos x}{\sqrt{4+3\sin x}}\,dx$

$u = 4+3\sin x$

$du = 3\cos x\,dx$

$\int_{4}^{4} \frac{\cos x}{u^{\frac{1}{2}}} \frac{du}{3\cos x}$

$\frac{1}{3}\int_{4}^{4} u^{-\frac{1}{2}}\,du = 0$

$\frac{1}{3}\left(2u^{\frac{1}{2}}\right)$

$\frac{2}{3}u^{\frac{1}{2}}$

b. $-1 < x < 1$

$(-1, 1)$

6.3 Integration by Parts

$$\int u\,dv = uv - \int v\,du$$

$$\int x\cos(x)\,dx$$

$u = x$ $\quad dv = \cos x\,dx$

$du = 1\,dx$ $\quad v = \sin x$

$= uv - \int v\,du$

$= x\sin x - \int \sin x\,dx$

$x\sin x - (-\cos x)$

$x\sin x + \cos x + C$

$x\cos x + \sin x - \sin x$ Check

$$\int xe^x dx$$

$u = x \quad dv = e^x dx$

$du = dx \quad v = e^x$

$$= xe^x - \int e^x dx$$

$$= xe^x - e^x + C$$

$$\int \ln x \, dx$$

$u = \ln x \quad dv = 1\,dx$

$du = \frac{1}{x} dx \quad v = x$

$$x \ln x - x + C$$

L I P E T

log s inverse trig polynomial exponential trig.

How to pick "u"!!

Repeated use of integration by parts

$$\int x^2 \cos(x)\,dx$$

$u = x^2$ $dv = \cos x\,dx$

$du = 2x\,dx$ $v = \sin x$

$$= x^2 \sin x - \int 2x \sin x\,dx$$

$u = 2x$ $dv = \sin x\,dx$

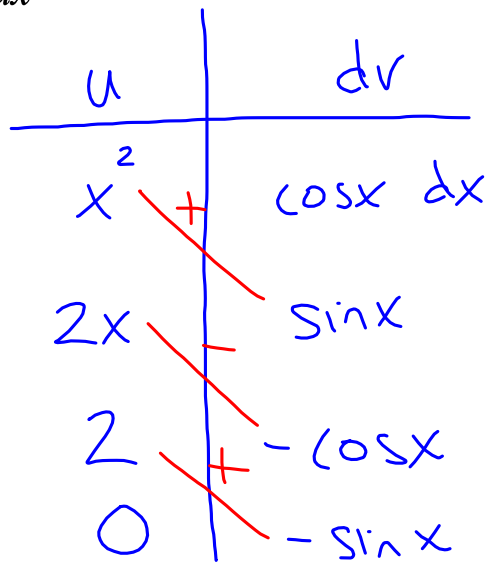
$du = 2\,dx$ $v = -\cos x$

$$x^2 \sin x - \left(-2x\cos x - \int -2\cos x\,dx\right)$$

$$x^2 \sin x + 2x\cos x - 2\sin x + C$$

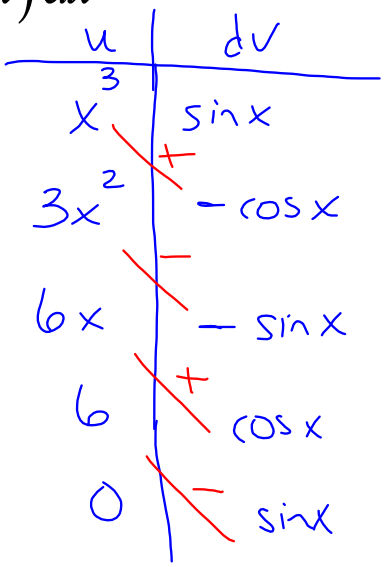
Tabular Integration

$$\int x^2 \cos(x)\,dx$$



$$x^2\sin x + 2x\cos x - 2\sin x + C$$

$$\int x^3 \sin(x)\,dx$$



$$-x^3\cos x + 3x^2\sin x + 6x\cos x - 6\sin x + C$$

Solve the differential equation $\frac{dy}{dx} = x\ln(x)$

subject to the initial conditions y = -1 when x = 1

Find the solution to the differential equation $\frac{dy}{dx} = \sin^{-1} x$
if the graph of the solution passes through the point (0,0)